SYSTEM AND METHOD FOR TESTING THE LOAD OF AT LEAST ONE IP-SUPPORTED DEVICE

The present invention is directed to a system, as well as to a method for testing the load state of at least one device in a communications network that is based on an IP (Internet protocol) standard, by a plurality of users.

Developers, system providers and administrators of large heterogeneous network configurations based on the IP standard, such as the Internet, are facing mounting challenges due to the rapid growth of the Internet and the speedy advancement in transmission and hardware technology. Therefore, testing a new network or network expansions prior to actual installation, for their load state, is considered an important task. By a load test, one understands, quite generally, the targeted loading of the network, particularly of the routers and servers connected to such a network, in order to determine their performance with respect to the required data throughput and the response time to a user request. There is, therefore, a need for a test system, which is able to test network components based on the IP standard, under real load conditions, to be able to ensure that all network components are functioning properly in an error-free manner, within their predefined performance limits.

U.S. Patent 5,669,000 describes a system for remotely testing a computer system, where instructions can be sent from a host computer 100 to so-called target machines. The target machines, in turn, perform actions that a user would otherwise undertake.

From EP 0 883 271, a method as well as a system are known for managing data-service systems. The test method is suited for generating test traffic or test signals to simulate a data transmission when subscribers access services. The known test system includes test devices which are set up as decentralized devices, which, via a plurality of so-called measuring routes, make it possible to determine the behavior of mutually influencing modules or the behavior of one module in the entire system.

The object of the present invention is, therefore, to devise a test system and a test method, which will enable the load of a device to be tested to be automatically tested by a plurality of network users, it being possible for the test system to be centrally operated by one single operator.

The present invention achieves this technical objective, first of all, by employing the features of Claim 1.

A core idea of the present invention is to provide a semi-automated test system, which is able to establish a plurality of mutually independent IP connections to a communications network based on the IP standard, in order to run, via these connections, mutually independent test procedures, which each correspond to the operations of a real network user. In very general terms, such a test system is designed for testing at least one device, in the loaded state, in a communications network based on the IP standard.

To this end, the test system includes at least one programmable control device having an assigned memory device in which a plurality of session scripts may be stored, each of which contains a predefined test procedure. In all the documents, a session script is understood to mean the scripted simulation, in recorded form, of a real network user, who typically performs actions based on the IP standard, such as establishing a connection to a provider, downloading files to

a server, using a web browser, and initiating the connection. A session script may contain, for example, a user ID, a user password, an IP destination address, for example of a server connected to the communications network, the user ID and the password of such a server and the service and communications protocol utilized, such as the FTP (file transfer protocol) or the HTTP (hypertext transfer protocol). It is important to point out that each session script contains a predefined number of operations that a real user could enter into a personal computer in order to request a specific IP service via the communications network.

In addition, at least one session computer is connected to the control device. Each session computer has a plurality of mutually independent connection interfaces, via which an independent IP connection to the communications network may be established at any one time. Assigned to each connection interface, in turn, is a script-processing device, also called load-generating device in the following, which, in dependence upon a session script assigned by the control device, may establish an IP connection to a device to be tested and start the predefined test procedure. This makes it possible to run a plurality of mutually independent test sessions in automated fashion between various simulated users and one or more devices connected to the communications network, such as of a router or a server, without an operator having to manually carry out a session at the session computer.

The complexity of the test system may be enhanced by applying the same or different session scripts to a plurality of load-generating devices of a session computer, which, in dependence upon the session script assigned in each instance by the control device, are then able to establish a separate IP connection to one or a plurality of the devices to be tested and initiate the corresponding test procedure. To this end, implemented in each session computer is a session-management device which supplies the session script

assigned by the control device to each load-generating device.

The session computers are designed to support every existing network-access technology. They will be able to be readily adapted to future network-access technologies. For example, every connection interface of a session computer may be connected to an analog and/or digital modem. It is also practical to insert one or more interface cards, for example LAN cards, into the session computers, which each have a plurality of connection interfaces. On the other hand, each connection interface of a session computer may be assigned to an analog or digital modem or be linked to a conventional concentrator to interface to an ATM (asynchronous transfer mode) network. As digital modems, ISDN modems or ADSL (asymmetric digital subscriber line) modems come under consideration. In this manner, a separate IP connection may be established via each connection interface of a session computer.

The control device and the session computer connected thereto may either be implemented in one single machine or be connected via a backbone network.

To be able to log and later analyze the various test sequences, each session computer has a memory for storing status data on each device to be tested and results and status messages from each initiated test procedure. The status data of a device to be tested are considered, in particular, to be the data throughput from and to the device to be loaded, as well as its response time. The response time of a device is understood, in this context, to be the time that the device requires to react to a specific request from a user.

The session computers transfer the stored status data on the tested devices and the results and status messages from each active test procedure to the control device which is able to display this data on a display device assigned thereto and

analyze the same. In addition, the control device has a keyboard assigned to it, via which one may enter new session scripts, for example, or intervene in active test procedures in order, for example, to abnormally terminate a test procedure or reset parameters. In this manner, the test system may be adapted to any hardware and software change in the communications network, merely by writing a new session script and storing it in the control device.

The communications network based on an IP standard is, for example, the Internet or any firm-specific Intranet. As devices to be tested, access routers and servers come into consideration, for example, which belong to various service providers. Servers, which are based on an IP standard, are generally known and are, therefore, not discussed in detail.

The technical objective is likewise achieved by the method steps of Claim 10.

The present invention is elucidated in the following on the basis of an exemplary embodiment, in conjunction with the enclosed figure.

The figure shows a test system, denoted by 10, with whose assistance, one may test the operability, for example, of the Internet 90, in particular of its network components, such as access routers 80, or of servers 100 of various service providers connected thereto, in the loaded state. Test system 10 may also be referred to as an IP load-test system, to indicate that the test system, as well as the components to be tested with respect to their load, support IP protocols. Test system 10 includes a control and service computer 20, to which a plurality of test computers, called "session computers" in the following, are connected, in the present example, via a star coupler 30 and a so-called backbone network 35. For the sake of clarity, merely three session computers 40, 50 and 60 are schematically depicted, session computer 40 being shown in

greater detail. For that reason, the design of the session computers in terms of circuit technology is principally explained with respect to session computer 40.

Control and service computer 20 has a keyboard, by way of which an operator may generate any permissible session scripts, for example, which are subsequently stored in a